APPENDIX 1. AIRSPACE EVALUATION

SECTION 1. BACKGROUND AND PROCEDURES

1. INTRODUCTION. The authority, regulations, and basic procedure for handling airspace evaluations are discussed in chapter 5. This appendix will establish detailed methods for such evaluations.

2. BACKGROUND. Due to the rapid growth of both aeronautical and commercial broadcast services, the number of interference cases involving aircraft and commercial broadcast emissions has increased dramatically. Interference is usually most severe at airports with high power FM and TV broadcast facilities nearby.

a. COMM receivers experience interference in the form of nuisance background noise, actual broadcast audio, and distorted or garbled reception of desired ground transmissions. NAVAID receivers (VOR and LOC) experience nuisance audio, actual errors in course deviation indicators, and erroneous flag indications. This interference to NAVAID receivers is the most serious. Course deviation errors during an approach and landing, the most critical phase of flight operation, are usually not as evident to the pilot as disrupted communications.

b. There are many factors that contribute to this problem. One is the broad power differential between commercial broadcast and aeronautical service transmitters. FM stations may operate at as much as 100 kW and many TV stations operate above the 100 kW level. In contrast, a LOC transmitter is typically operated at only 20 W, plus 12 to 20 dB gain “on course.” Outside the LOC antenna's main beam, the EIRP is considerably reduced.

c. There is no guard band between the high end of the FM broadcast band (107.9 MHz) and the low end of the aeronautical NAVAID band (108.0 MHz). Spurious emission levels from commercial transmitters are significant as far as 600 kHz off channel. Also, due to operating necessity, the minimum performance standards for aircraft receivers require them to be a broadband device.

3. FM BROADCAST TOLERANCES. FCC Rules and Regulations Part 73 authorize the operation of FM broadcast transmitters within certain standards and tolerances.

a. FMO's should review Part 73 which establishes policy that proponents who either (1) commence program tests, or (2) replace their antennas, or (3) request facility modifications and are issued a new construction permit, must satisfy all complaints of interference to aeronautical facilities during a one year period. Resolution of complaints will be at no cost to the FAA.

b. FM broadcast stations operate on 100 channels in the 88-108 MHz band (see figure 1). Channel carriers are 200 kHz apart on odd decimal frequencies. The first assignable channel is 88.1 MHz (Ch 201) and the last is 107.9 MHz (Ch 300). The FCC allocates FM channels to towns and cities across the nation according to a coordinated geographic assignment plan.

FIGURE 1. FM CHANNELS AND CENTER FREQUENCIES

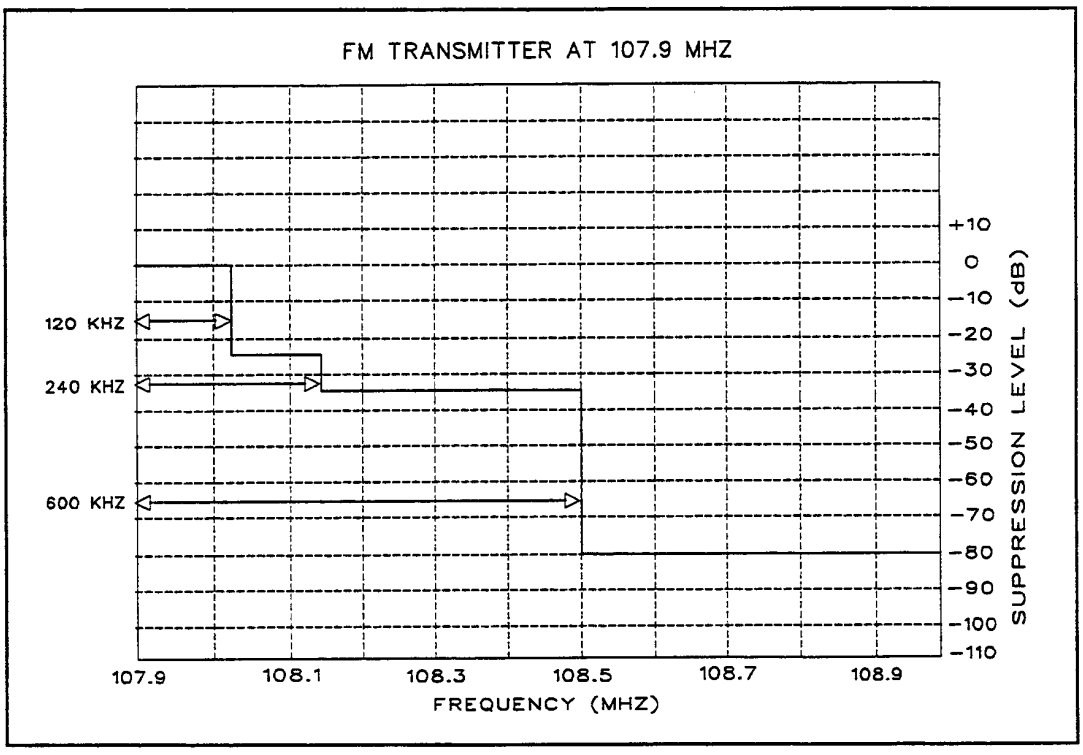
CHNL NO.	FREQ MHZ	CHNL NO.	FREQ MHZ
201	88.1	251	98.1
202	88.3	252	98.3
203	88.5	253	98.5
204	88.7	254	98.7
205	88.9	255	98.9
206	89.1	256	99.1
207	89.3	257	99.3
208	89.5	258	99.5
209	89.7	259	99.7
210	89.9	260	99.9
211	90.1	261	100.1
212	90.3	262	100.3
213	90.5	263	100.5
214	90.7	264	100.7
215	90.9	265	100.9
216	91.1	266	101.1
217	91.3	267	101.3
218	91.5	268	101.5
219	91.7	269	101.7
220	91.9	270	101.9
221	92.1	271	102.1
222	92.3	272	102.3
223	92.5	273	102.5
224	92.7	274	102.7
225	92.9	275	102.9
226	93.1	276	103.1
227	93.3	277	103.3
228	93.5	278	103.5
229	93.7	279	103.7
230	93.9	280	103.9
231	94.1	281	104.1
232	94.3	282	104.3
233	94.5	283	104.5
234	94.7	284	104.7
235	94.9	285	104.9
236	95.1	286	105.1
237	95.3	287	105.3
238	95.5	288	105.5
239	95.7	289	105.7
240	95.9	290	105.9
241	96.1	291	106.1
242	96.3	292	106.3
243	96.5	293	106.5
244	96.7	294	106.7
245	96.9	295	106.9
246	97.1	296	107.1
247	97.3	297	107.3
248	97.5	298	107.5
249	97.7	299	107.7
250	97.9	300	107.9

c. Maximum spurious emission levels for FM broadcast stations are:

Any spurious emission removed from the main carrier frequency by:	Must be attenuated below the unmodulated carrier by at least:
120-240 kHz	25 dB
240-600 kHz	35 dB
Beyond 600 kHz	43 dB + 10 Log P or 80 dB, whichever is the lesser (P = power output in watts)

d. An FM transmitter operates with a maximum allowable deviation of ±75 kHz around the carrier. Actual deviation is governed by the amplitude of the modulating signal and the rate of deviation is determined by the modulating frequency. An infinite number of sidebands theoretically results. Only sidebands down to 1 percent of the carrier amplitude are considered significant. Therefore, the total occupied bandwidth of an FM broadcast emission extends beyond ±75 kHz, but is subject to the spurious emission standards stated in subparagraph b. and shown in figure 2.

FIGURE 2. SPURIOUS EMISSION LEVEL OF AN FM BROADCAST TRANSMITTER ON 107.9 MHZ



e. The radiated power of an FM station is set by FCC standards, according to the class

of station and the transmitter antenna height. Power can be up to 600 kW in some cases.

f. The horizontal radiation pattern of a typical FM broadcast antenna is considered omnidirectional. The vertical pattern is a function of the gain and number of elements (bays) used by the antenna. Antenna radiation polarization may be horizontal, vertical or both.

4. TV BROADCAST TOLERANCES. FCC Rules and Regulations Part 73 authorizes the operation of TV broadcast transmitters within certain standards and tolerances.

a. TV broadcast stations operate on 12 VHF channels between 54-216 MHz and 56 UHF channels between 470-806 MHz (see figure 3). Channel carriers are 6 MHz apart. FCC allocates TV channels to towns and cities across the nation according to a coordinated geographic assignment plan.

b. The visual carrier is 1.25 MHz (±1 kHz) above the channel lower limit and may be offset by ±10 kHz. The aural carrier is 0.25 MHz (±1 kHz) below the upper channel limit (see figure 4).

c. The minimum radiated power for all classes of TV stations is 100 W.

d. Maximum power for TV stations is set by FCC standards according to the operating frequency (channel), geographical location and transmitter antenna height. Radiated power can reach as high as 5 MW for UHF channels under some conditions.

e. The TV broadcast transmission consists of the amplitude modulated visual carrier with a composite picture and synchronizing signals, together with the aural carrier frequency modulated by the audio signal. A vestigial sideband filter reduces the lower sideband width.

f. Spurious emissions, including RF harmonics, are required to be maintained at as low a level as the state of the art permits. All emissions removed in frequency in excess of ±3 MHz of the respective channel edge shall be attenuated no less than 60 dB below the visual transmitted power. These levels are measured at the output terminals of the transmitter.

g. Directional antennas may be employed to improve coverage. Polarization may be horizontal or circular. The maximum to minimum ratio of radiation in the horizontal plane shall not exceed 10 dB for channels 2-13 and 15 dB for channels 14-69.

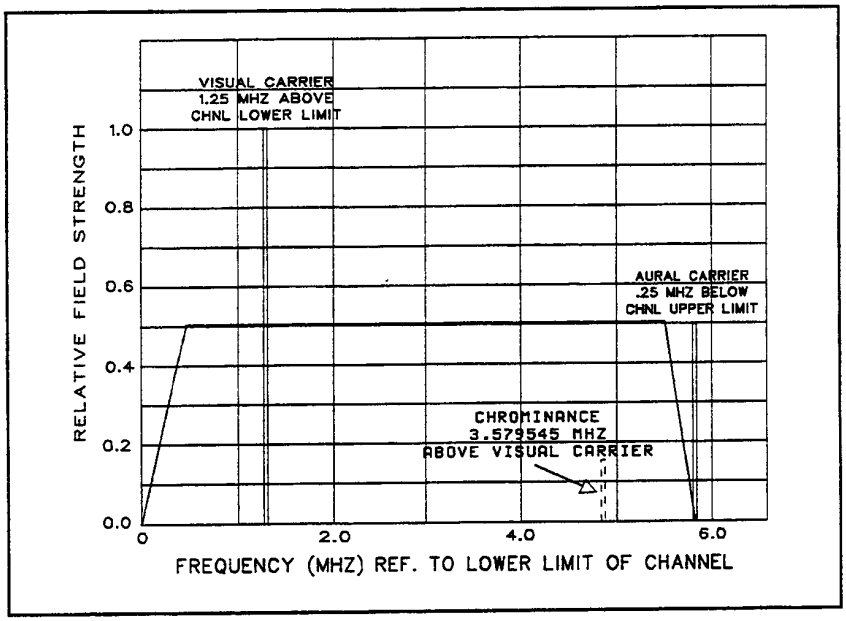
5. AM AND OTHER NONBROADCAST STATION STANDARDS. Other stations such as AM, cellular, microwave, etc. have different standards. For these facilities, the airspace evaluation is handled differently. Refer to Chapter 8 of this Order, paragraph 807.

6. STANDARD FPSV'S FOR FAA FACILITIES. The FPSV's for various facilities are discussed in detail in the portions of this order pertaining to specific types of equipment. Of concern in this appendix are the ILS LOC and VOR FPSV's. The standard and optional service volume dimensions for ILS's and VOR's are shown in the appendix.

FIGURE 3. TV CHANNELS AND ASSOCIATED FREQUENCIES

CHNL NO.	FREQ MHZ	CHNL NO.	FREQ MHZ
2	54-60	36	602-608
3	60-66	37	608-614
4	66-72	38	614-620
5	76-82	39	620-626
6	82-88	40	626-632
7	174-180	41	632-638
8	180-186	42	638-644
9	186-192	43	644-650
10	192-198	44	650-656
11	198-204	45	656-662
12	204-210	46	662-668
13	210-216	47	668-674
14	470-476	48	674-680
15	476-482	49	680-686
16	482-488	50	686-692
17	488-494	51	692-698
18	494-500	52	698-704
19	500-506	53	704-710
20	506-512	54	710-716
21	512-518	55	716-722
22	518-524	56	722-728
23	524-530	57	728-734
24	530-536	58	734-740
25	536-542	59	740-746
26	542-548	60	746-752
27	548-554	61	752-758
28	554-560	62	758-764
29	560-566	63	764-770
30	566-572	64	770-776
31	572-578	65	776-782
32	578-584	66	782-788
33	584-590	67	788-794
34	590-596	68	794-800
35	596-602	69	800-806

FIGURE 4. IDEALIZED STANDARD TV CHANNEL SPECTRUM



7. EVALUATION PROCEDURE OUTLINE. It is essential that airspace case study methods be thorough and consistent from region to region. An improper evaluation may cause difficult and lengthy legal proceedings for the agency. The outline presented in figure 5 is a guide for each evaluation.

8. DATA ASSEMBLY.

a. It is difficult to establish specific sources for retrieving the data necessary for an evaluation. Commercial broadcast data exist as hard copy listings and additional information can be obtained through FCC or from the broadcasters themselves. The AM, FM and TV data bases are available through the automated frequency management system (AFM).

b. When identifying commercial broadcast stations for an aeronautical study, specific radii have been established for each of the broadcast services based on probability and empirical tests. The greatest potential for interference comes from high power FM, particularly those stations operating at the high end of the FM band.

c. FAA and non-Fed facilities may be identified using the CIRCLE program or other search programs available through the AFM. If the proposed construction is an FM transmitter, the search should be for a 30 nmi radius around the new coordinates; if for a TV transmitter, 10 nmi; if for AM, 3 nmi.

FIGURE 5. EVALUATION PROCEDURE OUTLINE CHART

A. ASSEMBLE DATA

1) Commercial stations

a. Frequency
b. Coordinates
c. Power (EIRP)
d. Site elevations
e. Antenna height (AGL, AMSL, RCAMSL)
f. Antenna types and radiation patterns

2) FAA facilities

a. Frequency
b. Coordinates
c. FPSV's
d. Site elevations
e. Antenna height (AMSL)
f. Associated facilities

3) Charts

a. Low Altitude Sectional Charts
b. VFR Terminal Area Chart
c. Instrument Approach Plates
d. Topographical Maps (if necessary)

B. INTERMOD STUDY

1) Obtain third order intermod products
2) Use bandwidth of FAA facilities (usually ±100 kHz NAV and ±50 kHz COMM)
3) Include facilities within appropriate radii

C. GROUND FACILITIES

1) Calculate out-of-band signal level
2) Calculate in-band signal level
3) Include vertical patterns if necessary

D. AIRBORNE RECEIVERS

1) NAV interference — Use the Airspace Analysis Model to determine interference from FM broadcast stations to ILS localizer signals and VOR.

2) COMM interference (include vertical patterns if necessary)

a. Calculate brute force radius
b. Plot Venn diagrams along with FPSV's
c. Calculate intermod radii

d. Once these transmitters have been identified, specific data should be compiled for each. These shall include the station frequency, geographic coordinates, power (EIRP), terrain elevation, antenna elevation above mean sea level (AMSL) or above ground level (AGL), radiation center above mean sea level (RCAMSL) radiated power and possibly the radiation pattern of the antenna. When dealing with a TV transmitter, use the visual carrier frequency for all calculations, 1.25 MHz above the bottom frequency of the channel assignment; e.g., CH2 video carrier is 55.25 MHz within channel limits of 54-60 MHz.

e. The search should provide frequency, geographic coordinates, power (EIRP), terrain elevations, antenna elevations AGL and AMSL, FPSV's and associated facilities. The CIRCLE program automatically provides all these, plus the distance of each facility from the search coordinates.

f. NAVAID frequencies between 108.1-108.9 MHz and FM frequencies between 107.1-107.9 MHz particularly should be scrutinized. If a high power high band FM and a low band NAVAID are located within 30 nmi of each other, the likelihood of interference is high and requires very careful analysis. VHF TV channels 4 and 5 bracket the frequency used for ILS marker transmitters, 75 MHz, so careful analysis is required when these channels are proposed near ILS marker facilities.

g. AM, TV and non-broadcast sources should be plotted and studied in accordance with procedures outlined in sections 2 and 3 of this appendix.

h. FM sources are covered under the Airspace Analysis Model (AAM) program described in section 2 of this appendix.

9. INTERMOD STUDY.

a. **A receiver** will experience intermod interference whenever two or more signals or their integer multiples combine in such a manner that the product is the frequency to which the receiver is tuned (f_O). These signals combine in the nonlinear receiver input and other nonlinear external devices to produce sum and difference frequencies through heterodyne action. If a strong signal causes the receiver input to be overdriven, the effect is more pronounced.

b. These intermod products are of the following form:

$$A f_1 \pm B f_2 = f_O \qquad A f_1 + B f_2 - C f_3 = f_O \qquad 2A f_1 \pm B f_2 = f_O$$

c. The order of the intermod product is the sum of the coefficients in the formulas (A, B, and C). Products through the third order are of primary concern to airspace studies. Intermod calculations are very tedious. There are several desk calculator and computer programs available that will run all desired orders of intermod by just entering the subject frequencies. Consideration also must be given to the bandwidth of the victim receiver which is f_O ± bandwidth.

10. GROUND FACILITIES.

a. Both VHF and UHF ground receivers require protection from nearby commercial FM and TV broadcast stations. They may be affected by spurious (in-band) emissions and single frequency overload (out-of-band) interference. The latter is often referred to as "brute force" interference.

b. The major factors involved in calculating interference from spurious emissions (in-band) are the receiver sensitivity, the FCC-specified spurious emission limits, and the offending EIRP. Antenna, filter and receiver selectivity have no effect, since the spurious signal is an on-frequency interference. Spurious interference will result if the signal level from the broadcast station at the input to the victim receiver exceeds -104 db above one milliwatt (dBm). This is calculated as:

$$LEVEL = EIRP - L_v - L_d - L_p - L_r - Ssubr$$

INBAND level at victim frequency cannot exceed - 104 dBm

Where:

EIRP = Power of the potential interfering station in dBm.
[*EIRP* (in dBm) = 10 log (power in kW) + 62.2]

L_v = Free space transmission loss in dB at the victim receiver frequency.

L_d = Antenna vertical directivity loss in dB. This term requires antenna pattern data from the proponent. If the value is unknown, use 0 dB.

L_p = Polarization loss between the victim and broadcast antennas in dB. If the broadcast antenna is horizontally polarized, L_p = 16 dB; if circularly polarized, use 0 dB.

L_r = Receiver system on-frequency losses in dB. If value is unknown, use 3 dB.

S_r = FCC spurious emission tolerance in dB. Use 80 dB for FM transmitters and 60 dB for TV transmitters, except where the calculated value is less.

Example of S_r calculation:

The FCC spurious emission limit for FM is:
43 + 10 log ERP$_{(Watts)}$ or 80 dB, whichever is lesser

For an FM station with an ERP of 10 kW = 10,000 W:
10 log 10,000 = 10 x 4 = 40
Spurious limit = 43 + 40 = 83
Since 83 > 80, the spurious limit for this station is -80 dB from the main carrier.

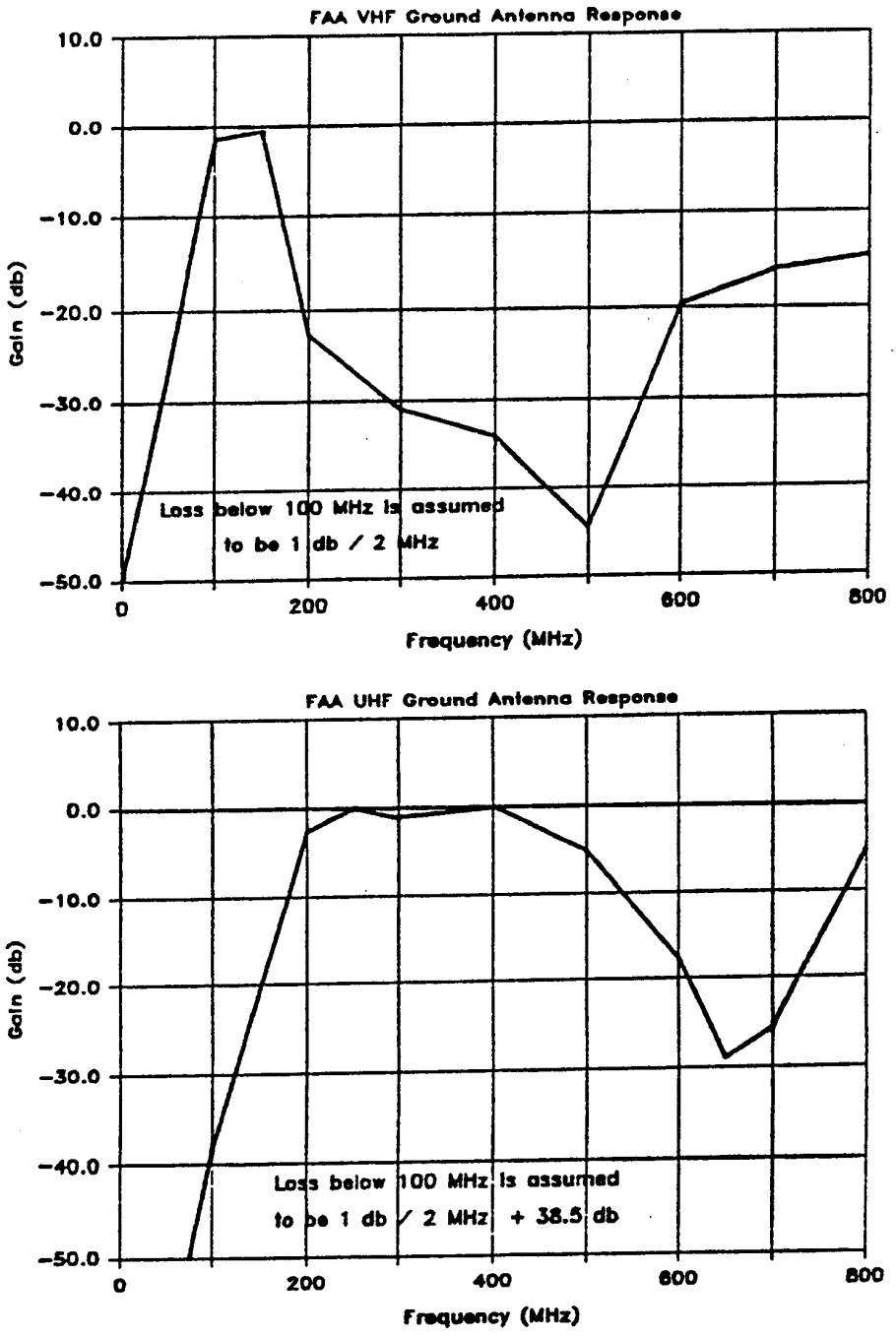
(Note that any power >5,000 W would be limited to -80 dB suppression.)

For an FM station with an ERP of 1,000 W:
10 log 1,000 = 10 x 3 = 30
Spurious limit = 43 + 30 = 73
Since 73 < 80, the spurious limit for this station is -73 dB from the main carrier.

For a TV station, the formula is:
43 + 10 log $ERP_{(Watts)}$ or 60 dB, whichever is lesser.

c. Ground RCF antenna gains vary considerably over the VHF and UHF range of possible interference. Plots of those gains through 800 MHz are shown in figure 6.

FIGURE 6. TYPICAL FAA VHF AND UHF RCF GROUND ANTENNA GAIN VS. FREQUENCY PLOTS



d. The Intermediate Frequency (IF) selectivity of a ground receiver will not provide

any protection from single frequency front end overload because this effect occurs in the receiver RF section which will respond to most frequencies within the commercial broadcasting bands. Tests have shown that a high power signal at the input to the victim receiver will overload the RF section when it exceeds **-4 dBm**. This level is calculated from the following relationship:

$$LEVEL = EIRP - L_i - L_d - L_p - L_r - Lsuba$$

OUT - OF - BAND level cannot exceed - 4 dBm

where:

EIRP = Power of the potential interfering station in dBm.
[*EIRP* (in dBm) = 10 log (power in kW) + 62.2]

L_i = Free space transmission loss in dB at the frequency of the potential interfering station.

L_i = 20 log (freq in MHz x D_a in ft) - 37.9]

L_d = Antenna vertical directivity loss in dB. This term requires antenna pattern data from the proponent. If the value is unknown, use 0 dB.

L_p = Polarization loss between the victim and broadcast antennas in dB. If the broadcast antenna is horizontally polarized, L_p = 16 dB; if circularly polarized, use 0 dB.

L_r = Receiver system on-frequency losses in dB. If value is unknown, use 3 dB.

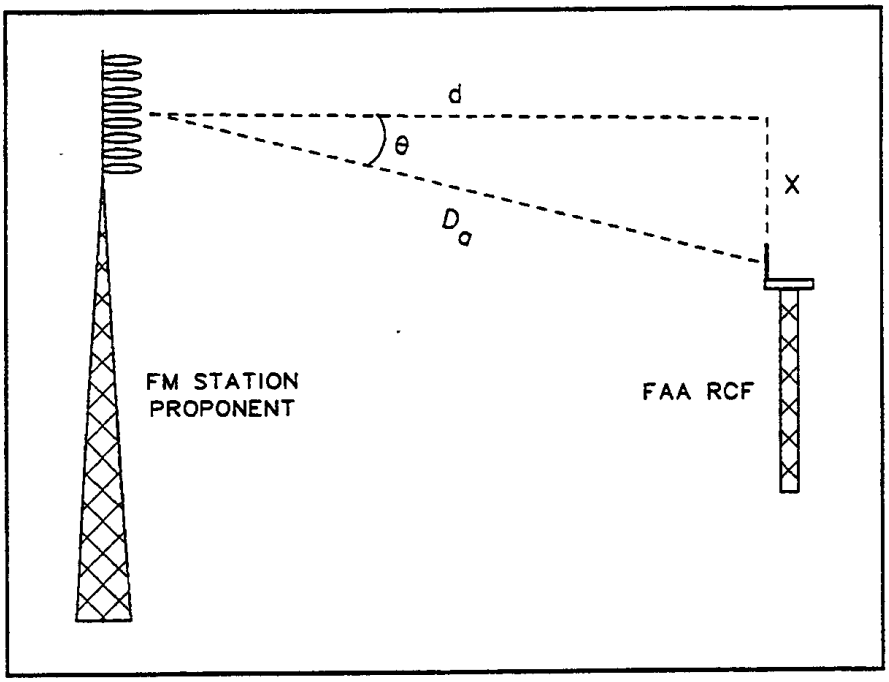
L_a = Typical A/G antenna loss in dB. If unknown, use 3 dB.

e. The slant range distance D_a in feet between antennas is calculated using the Pythagorean theorem. One side of the right triangle is the difference in the antenna heights (AMSL) *X* in feet and the other side *d* is the distance in feet between the antenna coordinates. The slant distance will then be the hypotenuse of the triangle. See figure 7. The GROUND.WK1 computer program works this out automatically, or to calculate the distance (in feet) between the antenna coordinates, use the following method:

$$D_a = \sqrt{(d^2 + X^2)}$$

Distances in feet between two locations expressed in coordinates can be determined by any of the great circle distance computer programs readily available, or if close, can be measured by tape.

FIGURE 7. EXAMPLE OF A PLOT FOR CALCULATING SLANT RANGE



11. AIRBORNE RECEIVERS. Data obtained through a series of bench and flight tests conducted by the FAA at the FAA Technical Center has established the signal strength levels required for intermod and brute force interference to occur. These data have been incorporated into the AAM which is used for all evaluations of the effects of FM broadcast station on ILS localizers and VOR's. Testing to add COMM receivers and other FAA facilities as well as other potential interferers is currently underway. Until that testing is finished, the Venn diagram method described below will be used for all situations not covered by the AAM.

a. For brute force predictions, signal levels of **-10 dBm** or greater are necessary. To produce intermod interference, at least one of the combining frequencies must be at a prime level, while the others are at a secondary level. The prime level will overdrive the receiver causing the nonlinearity required for heterodyning. For COMM receivers the prime level is **-10 dBm** and for NAV receivers, **-20 dBm**. In both receivers the secondary level is **-30 dBm**.

b. Since most commercial stations radiate omnidirectionally, these power contours can be constructed in the form of Venn diagrams. Wherever the Venn diagrams of prime and secondary signal levels overlap, intermod interference can be expected. Whenever the -10 dBm contour intersects a NAV or COMM FPSV, receiver overload will occur, regardless of the receiver frequency. If the station uses a directional antenna, the Venn diagram would have to be modified to match the contour level of radiation of the particular antenna.

c. These contour distances can be calculated using a form of the space loss formula:

$$d = \frac{antilog\ [(EIRP - P_r - 37.8 - L_r)/20]}{f}$$

Where:

$EIRP$ = Power of the station in dBm (ERP + 2.2)
P_r = Value of the desired signal strength (-10, -20, -30 dBm)
L_r = Antenna loss of aircraft [See data in subparagraphs (1) and (2)]
37.8 = Free space loss conversion for distance in nmi
d = distance of Venn radius in nmi
f = station frequency in MHz

(1) L_r for COMM antennas:

Above 175 MHz	15 dB
100-108	10 dB
88-108	10 dB + 2 dB/MHz below 100 MHz
Below 88	34 dB + 0.5 dB/MHz below 88 MHz

(2) L_r for NAV antennas:

Above 175 MHz	15 dB
88-108	03 dB + 1 dB/MHz below 108 MHz

Below 88	23 dB + 0.5 dB/MHz below 88 MHz

d. A plot of these functions is shown in figure 8.

e. Except for ILS localizer and VOR frequencies, if IM products exist at any FAA frequency, the Venn diagram procedure must be applied. Plot the locations of the offending stations on a chart along with the location of the FAA facility and/or its FPSV. Calculate the Venn diagram contour distances for prime and secondary levels according to the type of receiver effected. Plot these contours on the chart and note the intersecting areas. If the intersecting areas fall within the FPSV of the victim COMM facility, interference is probable.

f. The same procedure is followed for brute force interference. Plot the location of the offending station and construct only the -10 dBm contour. If this contour intersects the FPSV of any COMM or NAV facility, interference is probable while the aircraft is flying through the area. The frequency to which the aircraft receiver is tuned is irrelevant for brute force interference.

g. The AAM is to be used for all evaluation of the effects of FM broadcast proponents to ILS localizers and VOR's. Detailed instructions on using the AAM as well as technical background on the AAM is contained in the *User's Manual and Technical Reference for the Airspace Analysis Model*. This document is available from ASR.

12. SAMPLES. Samples of obstruction evaluation (OE) case studies will be found in the following sections 2 and 3 of this appendix. Figure 9 is the form filed by the proponent with typical data inserted.

FIGURE 8. RELATIVE GAIN OF AIRBORNE COMM AND NAV ANTENNAS

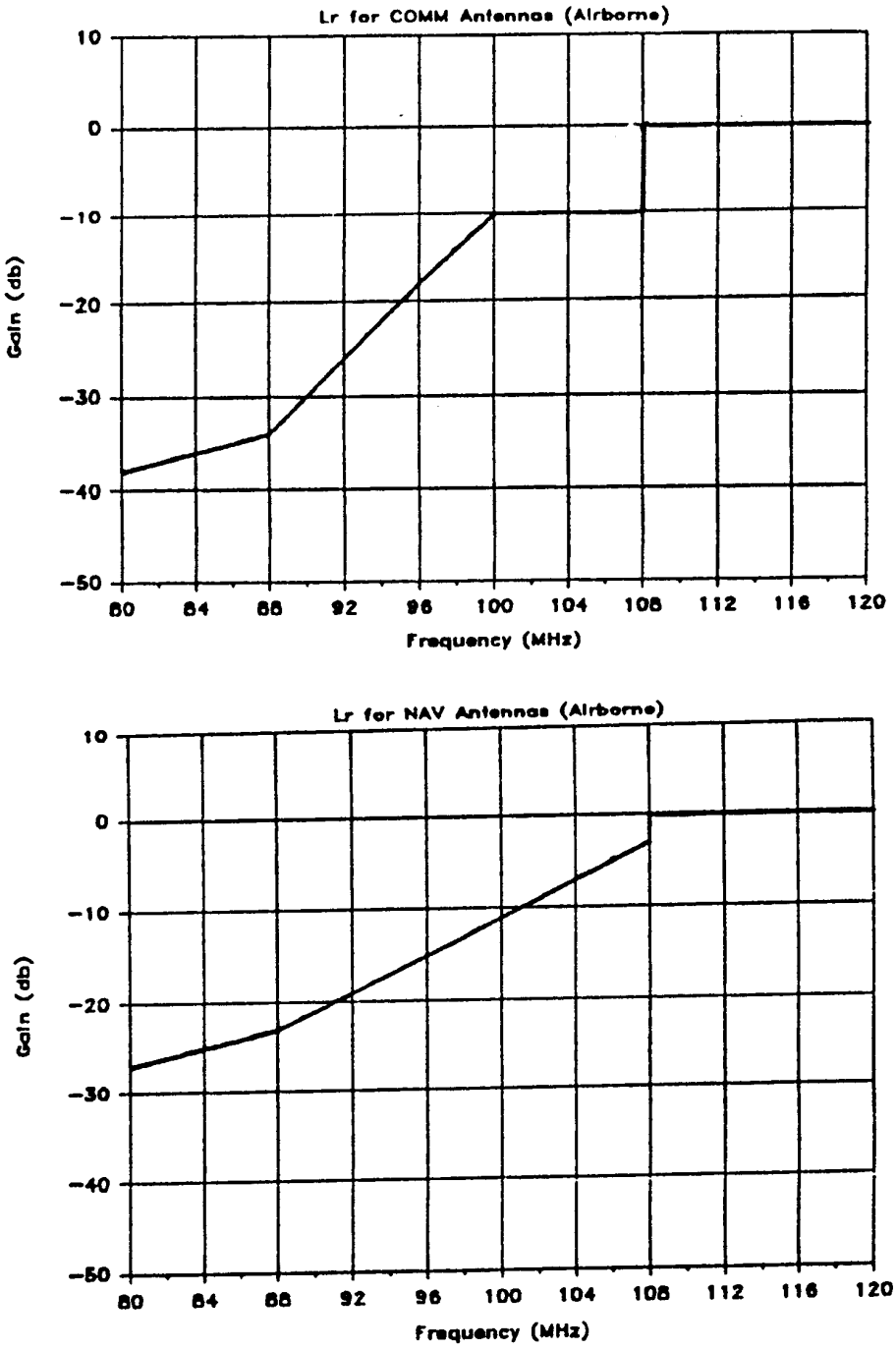


FIGURE 9a. FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

DO NOT REMOVE CARBONS *Please Type or Print on This Form* Form Approved OMB NO. 2120-0001

US Department of Transportation
Federal Aviation Administration

Notice of Proposed Construction or Alteration

Aeronautical Study Number:

1. Nature of Proposal

A. Type	B. Class	C. Work Schedule Dates
[X] New Construction [ ] Alteration *	[X] Permanent [ ] Temporary (Duration _____ months)	Beginning FAA approval End 90 days

* If Alteration, provide previous FAA Aeronautical Study Number, if available :

3A. Name, address, and telephone number of individual, company corporation, etc. proposing the construction or alteration. (Number, Street, City, State, and Zip Code)

WASR-FM, INC.
P. O. BOX 12345
SPRINGFIELD IL 34029
(309) 555-1212
Area Code Telephone Number

3B. Name, address and telephone number of proponent's representative, if different than 3A. above.

Markey Broadcast Engineering Consultants
1060 Coronado St.
Marlboro MD 20772
(301) 555-2121
Area Code Telephone Number

2. Complete Description of Structure

Please describe, on a separate sheet of paper if necessary, the proposed construction or alteration.

A. For proposals involving transmitting stations, include effective radiated power (ERP) and assigned frequency of all proposed or modified transmitters on the structure. (If not known, give frequency band and maximum ERP).

B. For proposals involving overhead wire, transmission lines, etc., include the size and the configuration of the wires and their supporting structures.

C. For all proposals, include site orientation, dimensions, and construction materials of the proposed or altered structure.

D. **Optional**— Describe the type of obstruction marking and lighting system desired for your structure. The FAA will recommend appropriate marking and lighting for the structure in accordance with the standards of Advisory Circular AC 70/7460-1. An FAA marking and lighting recommendation will reflect the minimum acceptable level of conspicuity necessary to warn pilots of the presence of an object. However, the FAA, under certain circumstances, will not object to the use of a system (such as a medium intensity flashing white light system or a dual lighting system) other than the recommended standard.

4. Location Of Structure

A. Coordinates (to hundredths of seconds, if known)			B. Nearest City or Town and State	C. Nearest public or military airport, heliport, flightpark, or seaplane base	5. Height and Elevation (to nearest foot)	
Latitude	° ' "		Springfield IL	Springfield Capital Airport	A. Elevation of site above mean sea level.	909'
39	45	06.31				
Longitude	° ' "		(1). Distance to 4B	(1). Distance from structure to nearest point of nearest runway	B. Height of structure including all appurtenances and lighting above ground or water.	335'
89	53	58.06	12 nmi	14.5 nmi		
4D. Source of coordinate information for item 4A. above.			(2). Direction to 4B	(2). Direction from structure to airport	C. Overall height above mean sea level (A + B)	1244'
[X] USGS 7.5' Quad Chart [ ] Survey [ ] Other Specify			305° T.	128° T.		

Indicate the reference datum of the coordinates, if known.
[ ] NAD 27 [X] NAD 83 [ ] Other Specify

4E. Describe, on a separate sheet of paper, the location of the site with respect to highways, streets, airports, prominent terrain features, existing structures, etc. Attach a copy of a U.S. Geological Survey quadrangle map 7.5 minute series (or equivalent) showing the construction site. If available, attach a copy of a documented site survey with the surveyor's certification.

FAILURE TO PROVIDE ALL REQUESTED INFORMATION MAY DELAY PROCESSING OF YOUR NOTICE

Notice is required by Part 77 of the Federal Aviation Regulations (14 C.F.R. Part 77) pursuant to Section 1101 of the Federal Aviation Act of 1958, as amended (49 U.S.C. app § 1501). Persons who knowingly and willfully violate the Notice requirements of Part 77 are subject to a civil penalty of $1,000 per day until the notice is received, pursuant to Section 901(a) of the Federal Aviation Act of 1958, as amended (49 U.S.C. app § 1471(a)) as well as the fine (criminal penalty) of not more than $500 for the first offense and not more than $2,000 for subsequent offenses, pursuant to Section 902(a) of the Federal Aviation Act of 1958, as amended (49 U.S.C. app § 1472(a)).

I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge. In addition, I agree to obstruction mark and/or light the structure in accordance with established marking & lighting standards as necessary.

Date	Typed or Printed Name and Title of Person Filing Notice	Signature
09-23-95	John J. Markey, President	John J. Markey

FOR FAA USE ONLY *FAA will either return this form or issue a separate acknowledgement.*

The Proposal:

[ ] Does not require a notice to FAA.
[ ] is not identified as an obstruction under any standard of FAR, Part 77, Subpart C, and would not be a hazard to navigation.
[ ] is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would not be a hazard to navigation.
[ ] Should be obstruction [ ] marked [ ] lighted per FAA Advisory Circular 70/7460-1, Chapters _____
[ ] Obstruction marking and lighting are not necessary.

Supplemental Notice of Construction, FAA Form 7460-2, is required any time the project is abandoned, or

[ ] At least 48 hours before the start of construction.
[ ] Within five days after the construction reaches its greatest height.

This determination expires on _____ unless:
(a) extended, revised or terminated by the issuing office;
(b) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit is made to the FCC on or before the above expiration date. In such cases the determination expires on the date prescribed by the FCC for completion of construction, or on the date the FCC denies the application.

NOTE: Request for extension of the effective period of this determination must be postmarked or delivered to the issuing office at least 15 days prior to the expiration date.

If the structure is subject to the licensing authority of the FCC, a copy of this determination will be sent to that agency.

Remarks

NAD 83 Coordinates (Use these coordinates for any future correspondence with the FAA)	Latitude	° ' "	Longitude	° ' "

Issued in	Signature	Date

FAA Form 7460-1 (1-93) *Do Not Remove Carbons*

FIGURE 9b. ADDENDA TO FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION

Addenda to FAA Form 7460-1 Re: WASR-FM

8-14-95

MARKEY BROADCAST ENGINEERING CONSULTANTS
1060 Coronado St.
Marlboro, MD 20772

Re: WASR-FM application for new FM station Antenna Tower.

The proposed antenna is a guyed 335_ tower, with 5-bay loop and 5-bay vertical dipole array, side-mounted antennas, with antenna array tops not exceeding the supporting tower height. The proposed Frequency is 103.7 MHz, @ 43 kW ERP.

It is proposed that painting and lighting not be required, as there is a 550_ tower 123_ due North of the proposed tower, which is painted and lighted per FAA/FCC requirements.

FIGURES 10. thru 14. RESERVED.

13. thru 16. RESERVED.